CLAIMS

1. A fluid controlling assembly for use in a direct oxidation fuel cell, which fuel cell has an anode chamber and a cathode chamber, the assembly comprising:

an adjustable component at least a portion of which is disposed within the cathode chamber of the fuel cell, and said component, when adjusted, regulates the rate at which fluids travel into and out of the cathode chamber of the fuel cell.

2. The fluid controlling assembly as defined in claim 1 wherein said adjustable component regulates the rate of flow of oxygen into and out of said cathode chamber and in a predetermined adjustment state is used to shut down the fuel cell by substantially preventing oxygen from flowing into said fuel cell.

3. The fluid controlling assembly as defined in claim 1 further comprising:

(i) at least one rotatably mounted frame disposed adjacent an oxygen source associated with a cathode side of said direct oxidation fuel cell;

(ii) a gas impermeable component comprised of a membrane that is disposed within said frame such that said frame in a first position controls the rate of the flow of oxygen into and out of the cathode chamber, and in a second position substantially resists the flow of oxygen into the cathode chamber.

4. The fluid controlling assembly as defined in claim 1 further comprising a plurality of frames rotatably mounted on hinges disposed over an oxygen source associated with the cathode side of said fuel cell, and each said frame includes a gas impermeable material disposed within the frame.

5. The fluid controlling assembly as defined in claim 1 wherein the direct oxidation fuel cell is an air breathing fuel cell, said oxygen source is ambient air, and said one or more frames are placed over the air breathing face of the fuel cell to control the flow of ambient air into and out of the fuel cell.

6. The fluid controlling assembly as defined in claim 1 further comprising a control system for variably actuating the position of said adjustable component of said fluid controlling assembly.

7. A fluid controlling assembly for use in a direct oxidation fuel cell, comprising:

(i) a first component that includes an aperture disposed in a cathode chamber of the direct oxidation fuel cell; and

(ii) a corresponding second component such that placement of the first component relative to the second component results in an opening that permits the flow of fluids therethrough, and when closed restricts the flow of fluids into the cathode chamber.

8. The fluid controlling assembly as defined in claim 7 further comprising said first and second components are generally planar components that include corresponding apertures, which when aligned create openings and said first and second components can be adjusted relative to one another to control the rate of fluid flow through said openings.

9. The fluid controlling assembly as defined in claim 8 further comprising said apertures of said first and second components being lined with a gas permeable, liquid impermeable film that controls the rate of flow of oxygen therethrough to control the cathode reactions, yet restricts the flow of liquid water therethrough such that humidity is maintained within the cathode chamber.

10 The fluid controlling assembly as defined in claim 7 further comprising a control system for variably actuating the position of at least one of said first and second components of said fluid controlling assembly.

11. A fluid controlling assembly for use with a direct oxidation fuel cell, comprising,

(A) a water control element substantially comprised of a porous, compressible material such that when said material is under compression, its tortuousity increases such

that less water is permitted to flow away from the cathode aspect of the membrane electrolyte of the direct oxidation fuel cell; and

(B) compression assembly that variably places said water control element under pressure when it is desired to control the amount of water in said cathode chamber.

12. The fluid controlling assembly as defined in claim 11 further comprising a control system for variably actuating the compression assembly.

13. A fluid controlling assembly for use with a direct oxidation fuel cell comprising

a water control element substantially comprised of an expandable material such that when the expandable material is activated, it expands to maintain water near the cathode aspect of the membrane electrolyte of the fuel cell.

14. The fluid controlling assembly as defined in claim 13 further comprising means for compressing said water control element to release water to allow water to escape out of the cathode chamber of the direct oxidation fuel cell.

15. The fluid controlling assembly as defined in claim 13 further comprising a control system for variably actuating the means for compressing said water control element of said fluid controlling assembly.

16. The fluid controlling assembly as defined in claim 13 further comprising a plurality of water control elements interleaved between openings in said fluid controlling assembly such that the rate of oxygen flow through said openings and the rate of water escape from said cathode chamber is controlled by said water control elements.

17. The fluid controlling assembly as defined in claim 16 further comprising said water control element being a flexible bladder disposed within a housing.

18. A fluid controlling assembly for use in a direct oxidation fuel cell comprising a thin film of substantially liquid impermeable, gas permeable material disposed within the

cathode chamber of the direct oxidation fuel cell to control rates of flow of water and oxygen in the cathode chamber.

19. The fluid controlling assembly as defined in claim18 wherein said thin film includes one or more slits therein which open when said thin film is stretched to create apertures thereby allowing greater rate of oxygen flow into the cathode chamber and allowing a greater water escape rate from of the cathode chamber in predetermined operating circumstances.

20. A fluid controlling assembly for use in a direct oxidation fuel cell comprising a first component that includes a plurality of rods that have one edge of a thin film of gas permeable, liquid impermeable strip of material attached thereto; and
a corresponding second component that has rods to which a second edge of each said thin film of gas permeable, liquid impermeable strip of material is attached and the rods of said second component are offset from the rods of the first component such that placement of the first component relative to the second component results in a closure of the assembly that resists flow of oxygen into the chamber and when open, controls the rate of flow of oxygen into the cathode chamber.

21. The fluid controlling assembly as defined in claim 20 further comprising a control system for variably actuating the placement of said first and second components.

22. A direct oxidation fuel cell comprising:

(A) a membrane electrolyte intimately interfacing with a catalyst layer along each of membrane's major surfaces, being a catalyzed membrane electrolyte, having an anode aspect and a cathode aspect;

(B) an anode catalyst is disposed in contact with an anode aspect of the protonically conductive, electronically non-conductive membrane electrolyte;

(C) a cathode catalyst that is suitable for oxygen electro-reduction reactions which is disposed in contact with a cathode aspect of the protonically conductive, electronically non-conductive membrane electrolyte;

(D) a cathode fluid controlling assembly that controls the water escape rate of the produced in said reactions, and which controls the rate of flow of oxygen into and out a cathode chamber as needed for said reactions; and

(E) a load coupled across said fuel cell.

23. A direct oxidation fuel cell system comprised of:

(A) a membrane electrode assembly including:

i. a protonically conductive, electronically non-conductive membrane electrolyte;

ii. an anode catalyst that is disposed in contact with an anode aspect of the protonically conductive membrane electrolyte;

iii. a cathode catalyst that is suitable for oxygen electro reduction reactions which is disposed in contact with a cathode aspect of the protonically conductive, electronically non-conductive membrane electrolyte; and

iv. a cathode fluid controlling assembly that controls a water escape rate of the water produced in said reactions and controls the rate of flow of oxygen into and out a cathode chamber as needed for said reactions;

(B) a housing;

(C) a means by which electrical connections can be made;

(D) a means by which fuel can be introduced to the fuel cell;

(E) a fuel source; and

(F) an oxygen source.

24. A method of controlling the delivery of oxygen and the escape of water from the cathode chamber of a direct oxidation fuel cell, including the steps of:

(A) providing an adjustable fluid controlling assembly that controls the flow of oxygen into and out of said cathode chamber and maintains water in proximity to a cathode aspect of the fuel cell; and

(B) variably actuating a member in said adjustable fluid controlling assembly to regulate oxygen flow to said cathode aspect and to maintain humidity within said cathode chamber.

25. The method as defined in claim 24 including the further step of variably actuating said controlling assembly based upon one of the following:

operating characteristics of the fuel cell;

temperature of the fuel cell;

state of the fuel cell, being powered down or operating; and

manual operation.

26. The method as defined in claim 24 including the further step of shutting the fuel cell down by intentionally blocking oxygen access to the cathode chamber.